CA-NV AWWA Water Loss Technical Assistance Program

Wave 4 Water Audit Level 1 Validation Document

Validator Provided

Audit Information:

Utility: Ramona Municipal Water District PWS ID: 3710019

System Type: Potable Audit Period: Calendar 2016

Utility Representation: Joe Lomelli, Ricardo Soto

Validation Date: 9/19/2017 Call Time: 10am Sufficient Supporting Documents Provided: Yes

Validation Findings & Confirmation Statement:

Key Audit Metrics:

Data Validity Score: 68 Data Validity Band (Level): Band III (51-70)

ILI: 0.49 Real Loss: 22.25 (gal/conn/day) Apparent Loss: 3.49 (gal/conn/day)

Non-revenue water as percent of cost of operating system: 3.5%

Certification Statement by Validator:

This water loss audit report has been Level 1 validated per the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34.

All recommendations on volume derivation and Data Validity Grades were incorporated into the water audit. ☒

Validator Information:

Water Audit Validator: Lucy Andrews / Carolyn Prescott (support) Validator Qualifications: Contractor for CA-NV AWWA Water Loss TAP

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#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
1	Volume from Own Sources	VOS	n/a		
2	VOS Master Meter & Supply Error Adjustment	VOS MMSEA	n/a		
3	Water Imported	WI	7	Import meter profile: Purchase water exclusively from County Water Authority and City of through two treated interconnections and one raw interconnection (raw connection is excluded from this consideration). All connections are metered with Venturi meters. WI input derived from: Totalization of volumes per redundant meter reads by utility. Comments: Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed. Currently installing a redundant meter downstream of import meters.	Percent of import supply metered: 100% Signal calibration frequency: Quarterly. Volumetric testing frequency: None. Volumetric testing method: n/a. Percent of import supply tested and/or calibrated: 100% Comments: Meters are owned by County Water Authority.
4	WI Master Meter & Supply Error Adjustment	WI MMSEA	8	Input derivation: Left blank in absence of available test data. Comments: No additional comments.	Import meter read frequency: Continuous via SCADA. Daily manual reads by Ramona. Import meter read method: Manual and automatic logging. Frequency of data review for trends & anomalies: Monthly. Comments: No additional comments.
5	Water Exported	WE	n/a		
6	WE Master Meter & Supply Error Adjustment	WE MMSEA	n/a		
7	Billed metered	BMAC	5	Customer meter profile: Age profile: 9500 service connections with a variety of ages (5-15 years). Reading system: Manual and AMR. Read frequency: Customers are either read monthly or bimonthly depending on which route they fall within. Comments: Lag-time correction is not employed in input derivation. Input derivation from supporting documents confirmed. Exclusion of non-potable volumes confirmed.	Percent of customers metered: 100% Small meter testing policy: Reactive - complaint based or flagged-consumption testing only. Have an in house test bench. Number of small meters tested/year: Not quantified, but known to be small. Large meter testing policy: Reactive - complaint based or flagged-consumption testing only.

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
					Number of large meters tested/year: Not quantified, but known to be small. Meter replacement policy: Meter replacement focuses on older meters. Number of replacements/year: 10% of customer meters. Billing data auditing: Standard billing QC, plus review of volumes by use type each billing cycle. Comments: No additional comments.
8	Billed unmetered	BUAC	n/a	Profile: No flat rate customers exist.	
9	Unbilled metered	UMAC	10	Profile: Includes water transfer from potable system to raw system. This occurs through four different meters. Own use is billed. Input derivation: Direct from meter readings. Read monthly. Comments: Input derivation from supporting documents confirmed.	Policy for billing exemptions: Specific use. Comments: Meters installed at the beginning of last year.
10	Unbilled unmetered	UUAC	5	Profile: Operational flushing and fire department usage. Comments: Flushing activities greatly scaled back due to drought. Custom California default of 0.25%xWS utilized.	Comments: Default grade applied.
11	Unauthorized consumption	UC	5	Comments: Default input applied. There is believed to be a high amount of theft in system at the hands of contractor trucks and customers who no longer have wet wells.	Comments: Default grade applied.
12	Customer metering inaccuracies	CMI	3	See BMAC comments regarding meter testing & replacement activities. Input derivation: Rudimentary estimate. Comments: No additional comments.	Characterization of meter testing: Limited (upon request AND consumption flag only). Characterization of meter replacement: Currently working to replace customer meter stock. Comments: No additional comments.
13	Systematic data handling errors	SDHE	5	Comments: Default input applied. Billing software has just been upgraded.	Comments: Default grade applied.
14	Length of mains	Lm	9	Input derivation: Totaled from GIS based map. GIS has been in place for 10 years with most recent update occurring 5 years ago. Hydrant leads included: Yes. Comments: No additional comments.	Mapping format: Digital. Also have paper map records. Asset management database: In place and integrated with GIS system.

#	AWWA Water Audit Input	Code	Final DVG	Basis on Input Derivation	Basis on Data Validity Grade
					Map updates & field validation: Accomplished through normal work order processes. Comments: No additional comments.
15	Number of service connections	Ns	9	Input derivation: Number pulled from UWMP. Original total from billing and finance. Basis for database query: Meter ID - non-premise based. Comments: No additional comments.	CIS updates & field validation: Accomplished through normal meter reading processes. Standard process for new account activation. Estimated error of total count within: 2%. Comments: No additional comments.
16	Ave length of cust. service line	Lp	9	Comments: Customer meters are typically 10ft from curb stop.	
17	Average operating pressure	AOP	4	Number of zones, general profile: Operate two pressure zones which are regulated with several PRVs. Customers have pressure regulators. Typical pressure range: 33 – 350 PSI. Customer pressures between 65-200 PSI Input derivation: Inferred from observations of pressure readings in field or review of pressure measurements. Comments: No additional comments.	Extent of static pressure data collection: Hydrant pressures taken during routine system flushing and/or hydrant testing. Characterization of real-time pressure data collection: Basic - telemetry or pressure logging at boundary points (supply locations, tanks, PRVs, boosters). Hydraulic model: None currently in place. Comments: No additional comments.
18	Total annual operating cost	TAOC	10	Input derivation: From official financial reports. Comments: Confirmed costs limited to water only, and water debt service included.	Frequency of internal auditing: Annually. Frequency of third-party CPA auditing: Annually. Comments: No additional comments.
19	Customer retail unit cost	CRUC	10	Input derivation: Simple rate structure with only a single volumetric rate. Sewer charges are not based on water meter readings. Sewer revenues are not incorporated into calculation. Comments: No additional comments.	Characterization of calculation: Composite via simple rate structure with only a single rate. Input calculations have been reviewed by an M36 water loss expert. Comments: No additional comments.
20	Variable production cost	VPC	5	Supply profile: Import supply only. Primary costs included: Purchase costs and supply & distribution power. Secondary costs included: None currently included. Comments: No additional comments.	Characterization of calculation: Primary costs only. Input calculations have not been reviewed by an M36 water loss expert. Comments: No additional comments.

Key Audit Metrics

(~)	VALIDITY	Data Validity Score: 68	Data Validity Band (Level): Band III (51-70)	
(#)	VOLUME	ILI: 0.49	Apparent Loss: 3.49 (gal/conn/day)	Real Loss: 22.25 (gal/conn/day)
($)	VALUE		Annual Cost of Apparent Losses: $92,129	Annual Cost of Real Losses: $266,655

Infrastructure & Water Loss Management Practices:

Infrastructure age profile: Installed between 1920s – 2016. Infrastructure replacement policy (current, historic): **Replacing a certain number of feet over next 10 years.**

Estimated main failures/year: 6 Estimated service failures/year: 18

Extent of proactive leakage management: None currently in place.

Other water loss management comments: No additional comments.

Comments on Audit Metrics & Validity Improvements

The Infrastructure Leakage Index (ILI) of 0.49 describes a system that experiences leakage at 0.49 times the modeled technical minimum for its system characteristics. While this system may experience low volumes of leakage, the ILI after level 1 validation indicates that advanced validation is warranted before conclusions can be made regarding the system's leakage. At least one of the following scenarios may contribute to this result:

- **Water Supplied (both Own Source and Imported Water) may be understated**. This can occur if supply meters are under-registering more significantly than is currently reflected in the Master Meter Error & Supply Adjustment (MMSEA). This can also occur if the supply volumes include uncorrected inaccuracies in the data archives due to data gaps or SCADA formula errors.
- **Authorized consumption may be overstated.** This can occur if sales volumes have not been pro-rated to align consumption with dates of actual use instead of the dates of meter reads. This can also occur if the BMAC input includes any non-potable volumes or duplication/exclusion of potable volumes.
- **The estimate of average operating pressure may be too high**, thereby overestimating the technical minimum volume of leakage for the system.

The Data Validity Score falling within Band III (51-70) suggests that next steps may be focused simultaneously on improving data reliability and evaluating cost-effective interventions for water & revenue loss recovery. Opportunities to improve the reliability of audit inputs and outputs include:

- Improved understanding of Supply Meter (Own or Import) Master Meter Error: consider adopting or increasing the rigor of a source meter volumetric testing and calibration program, informed by the guidance provided in AWWA Manual M36 – Appendix A.
- Improved estimation of CMI: consider a customer meter testing program which tests a sample of random meters whose stratification (by size, age, or other characteristics) represents the entire customer meter stock.
- Level 2 validation on raw data for Billed Metered Authorized Consumption to determine and resolve any instances of potable volume duplication or non-potable volume inclusion.

When the CA-NV AWWA Water Audit Validator (WAV) program comes online after this year, is the utility planning on having a staff member become certified to perform the Level 1 Validation for future audits? Yes.

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Utility Provided

Water System Name: RAMONA MUNICIPAL WATER DISTRICT **Water System ID Number:** 3710019 **Water Audit Period:** Calendar 2016

Water Audit & Water Loss Improvement Steps:

Steps taken in preceding year to increase data validity, reduce real loss and apparent loss as informed by the annual validated water audit:

Implemented a meter replacement program with new radio read (AMR) meters. Completed pump efficiency testing at all pump stations as well as calibration of meters at all pump stations. Upgraded the old D.O.S. based billing software to a new billing software (Tyler). Adopted a 10 year water system infrastructure facilities plan to address aging infrastructure and improvements within the District's water system.

Certification Statement by Utility Executive:

This water loss audit report meets the requirements of California Code of Regulations Title 23, Division 2, Chapter 7 and the California Water Code Section 10608.34 and has been prepared in accordance with the method adopted by the American Water Works Association, as contained in their manual, ***Water Audits and Loss Control Programs, Manual M36, Fourth Edition*** and in the Free Water Audit Software version 5.

Richard Hannasch	Finance Manager	Richard Hannasch	9/29/17
Executive Name (Print)	Executive Position	Signature	Date